

CERTS 2005 Microgrid Symposium

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**Office of Electricity Delivery and
Energy Reliability**

June 17, 2005





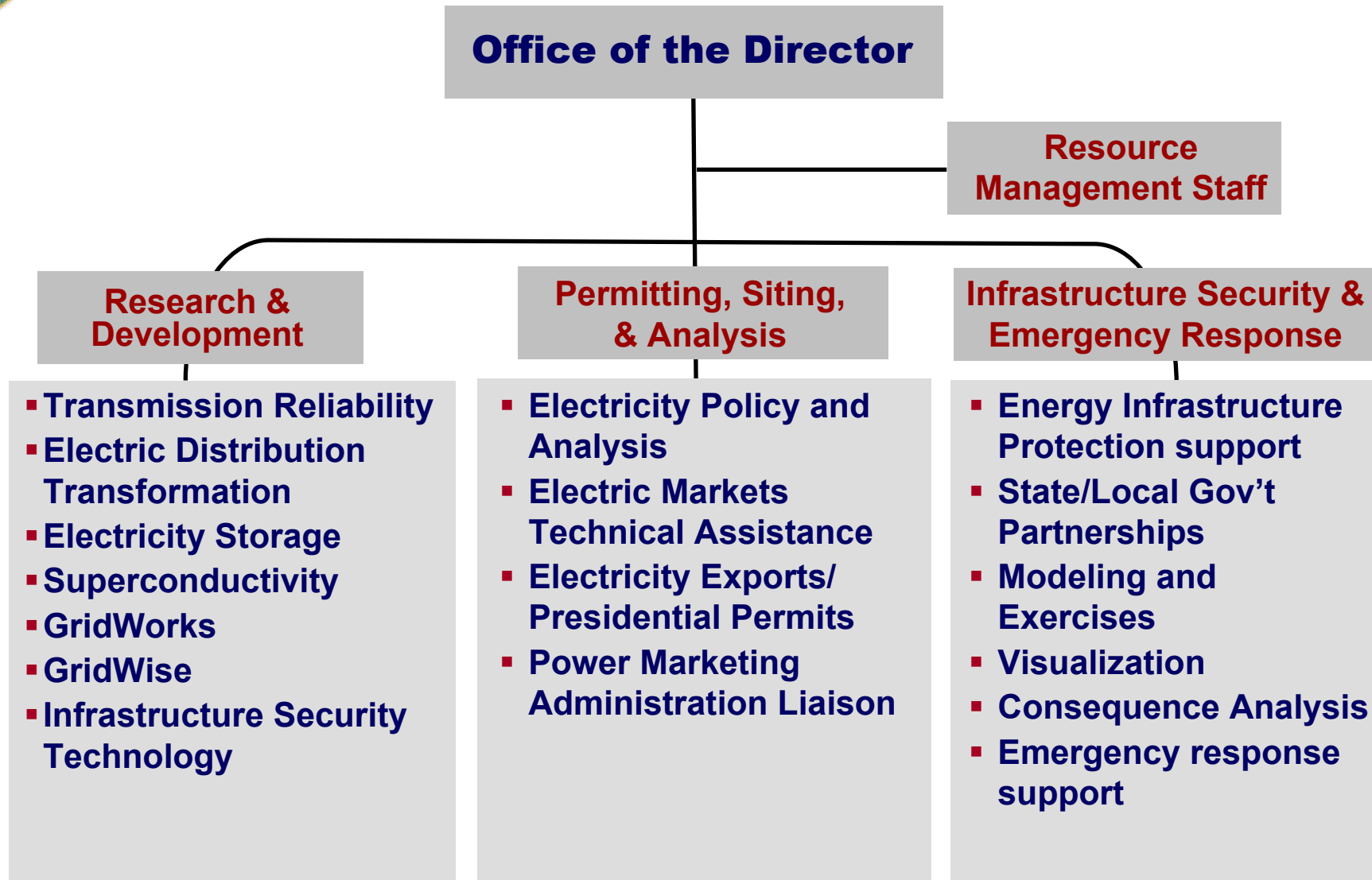
Office of Electricity Delivery and Energy Reliability (OE)

Mission

***Lead national efforts to modernize
the electric grid, enhance security
and reliability of the energy
infrastructure, and facilitate recovery
from disruptions to energy supply.***

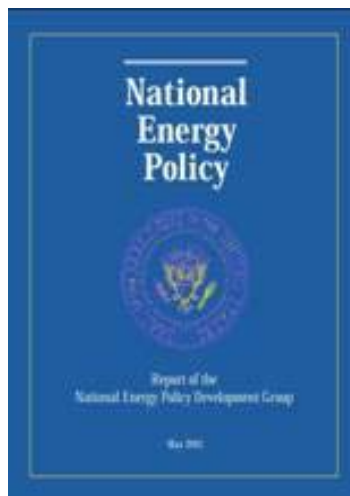


Organizational Structure

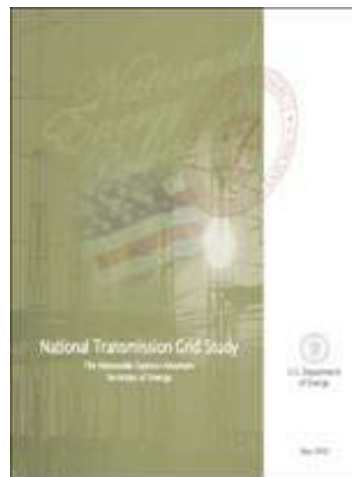




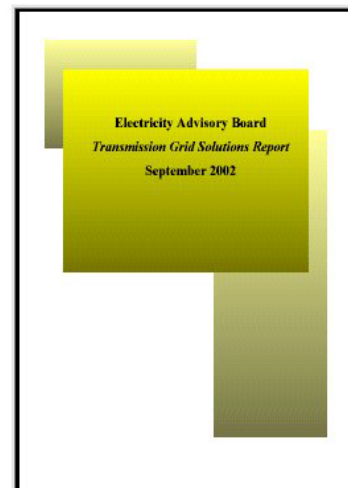
Strategic Guidance



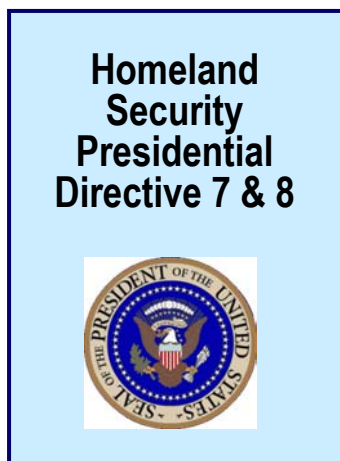
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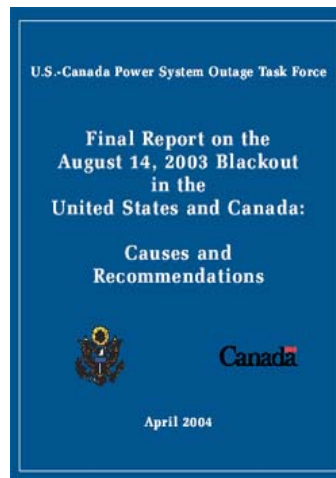
May 2002



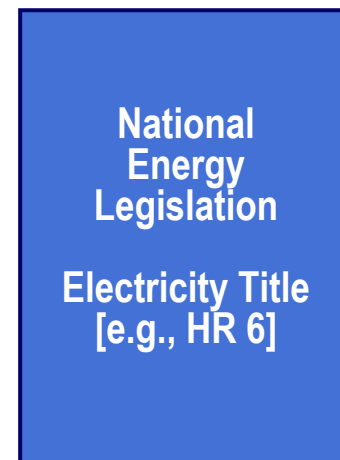
September 2002



December 2003



April 2004



**2003, 2004,
2005, 200?**



OE Priorities

- **Facilitate passage of an effective electricity title in the energy bill**
- **Mobilize efforts to modernize and enhance the grid, using advanced technologies**
- **Identify National Interest Electric Transmission Constraints**
- **Rebuild DOE capacity to assist industry in safeguarding against cyber security threats**
- **Help states and industry bolster security of critical energy infrastructure**
- **Assist states and industry to recover from a disruptive loss of energy supply.**



Joint DOE/CEC Activities FY04-5

- **Business Case and Benefits Assessment**
- **Vision & Technology Roadmap Workshop – June 2005**
- **International R&D Symposium – June 2005**
- **CERTS Microgrid**
- **Solicitation**



Challenges Facing the Grid

- **Power quality**
- **Reliability**
- **Lack of new investment in the grid**
- **Greater demand on the grid**
- **Vulnerability to natural disasters and terrorist attacks**
- **DG required to shut down during a disturbance on the grid**
- **Intermittency of renewable sources**
- **Environmental constraints – emissions and siting of generators and power lines**



Remote Power Challenges

- **Military installations**
- **Villages and rural areas**
- **Native America reservations**
- **Geographic islands – Hawaii, Puerto Rico, Guam, Virgin Islands**



Microgrids Can Help Address These Challenges

- **A microgrid is an integrated power delivery system consisting of interconnected loads and distributed energy resources which as an integrated system can operate in parallel with the grid or in an intentional island mode.**
- **The integrated DER are capable of providing sufficient and continuous energy to a significant portion of the internal load demand even in island mode. The microgrid possesses independent controls and can island with minimal service disruption.**



Potential MicroGrid Benefits

To Users or Customers:

- **Economics**
 - Potential spark spread savings
 - Thermal energy savings when CHP employed
 - Potential for economic dispatch of generation assets
- **Power reliability & availability**
 - Multiple generation assets
 - Isolation from local grid problems
- **Power quality**
 - Local voltage control
 - Voltage and current harmonic improvement



Potential MicroGrid Benefits

To Utilities:

- Transmission and distribution support in constrained areas.
- Potential revenue from “premium power” product offered to customers.
- Potential revenue for thermal energy product in addition to electrical energy.
- Can behave as a single interruptible load.
- Can behave as a single dispatchable generation resource.



Potential MicroGrid Benefits

To Society:

- Potential for more efficient overall fuel use than traditional generation.
- Potential for reduced emissions compared to centralized utility system.
- Ability to allow high penetration of renewable generation.
- Increased security of overall power delivery infrastructure.



Potential Applications

- **Military Installations**
- **Power for essential and critical services (police, fire, EMT, water treatment facilities)**
- **Emergency response and restoration services during such events as hurricanes, terrorist attacks**
- **Remote Power: islands, rural areas, villages, Native American reservations**
- **Hospitals**
- **Residential development**
- **Campus**
- **Commercial/industrial office park**
- **Substation scale systems**



OE Microgrid Next Steps

- **Complete a business case and benefits assessment to determine feasibility and viability of the concept in the marketplace**
- **Develop a vision of the microgrid concept and how it can be applied**
- **Develop a pathway to reach the vision**
- **Identify the R&D gaps**
- **If the business case and benefits assessment warrants DOE will develop a multi-year plan**